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 (12) **Reissued Patent**  
**Brown**

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(54) **SEVERE WEATHER DETECTOR AND ALARM**

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(51) **Int. Cl.**  
**G01W 1/02** (2006.01)  
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(52) **U.S. Cl.** ..... **702/3; 702/2; 342/26 R**  
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 See application file for complete search history.

(56) **References Cited**

#### U.S. PATENT DOCUMENTS

3,326,045 A 6/1967 Vrsaljko  
 (Continued)

#### FOREIGN PATENT DOCUMENTS

EP 0 622 639 11/1994  
 (Continued)

#### OTHER PUBLICATIONS

Certified translation of JP 63-204896, Schreiber Translations, Inc. pp. 1-6.\*

(Continued)

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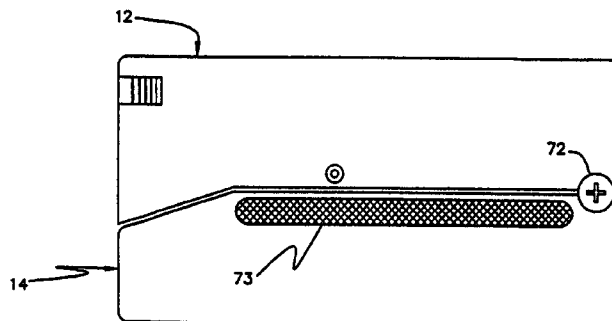
(57) **ABSTRACT**

A compact, portable weather station for predicting local extreme weather conditions and for reporting remote weather conditions. The weather station has sensors for determining local temperature, barometric pressure, humidity, ambient light, and ambient static charge. A microprocessor has memory for storing data relating to past weather conditions and data processing apparatus and algorithms for determining probable developing weather conditions responsive to sensed local conditions. The weather station has a radio receiver for communicating with global weather reporting communications systems utilizing cellular communications. Operating commands, predicted local weather conditions, and remote weather conditions are annunciated in synthesized voice in any one of a variety of predetermined languages. The weather station includes voice synthesizing and recognition apparatus for annunciating verbal prompts and weather conditions, and for responding to vocal control. The weather station is formed in two separable components, one having sensors and the other having radio communications apparatus.

#### REEXAMINATION RESULTS

The questions raised in reexamination proceeding No. 90/008,410, filed Jan. 5, 2007, have been considered, and the results thereof are reflected in this reissue patent which constitutes the reexamination certificate required by 35 U.S.C. 307 as provided in 37 CFR 1.570(e) for *ex parte* reexaminations, or the reexamination certificate required by 35 U.S.C. 316 as provided in 37 CFR 1.997(e) for *inter partes* reexaminations.

**20 Claims, 13 Drawing Sheets**



# US RE43,903 E

Page 2

## U.S. PATENT DOCUMENTS

3,430,217	A	2/1969	Bridge et al.	
3,541,450	A	11/1970	Paine	
3,582,921	A	6/1971	Krieger	
3,603,951	A *	9/1971	Bracken et al.	340/539.28
3,851,191	A	11/1974	Deebel et al.	
4,031,467	A *	6/1977	Singleton et al.	455/526
4,035,802	A	7/1977	Jagermalm et al.	
4,106,340	A	8/1978	Hamid	
4,130,798	A	12/1978	Maclaren	
4,140,999	A	2/1979	Conway	
4,163,216	A	7/1979	Arpino	
4,184,159	A	1/1980	Andersson	
4,218,755	A *	8/1980	Root	702/3
4,230,989	A	10/1980	Buehrle	
4,257,112	A	3/1981	Hubner	
4,259,864	A *	4/1981	Tavoni	73/170.16
4,274,475	A	6/1981	Rall et al.	
4,277,845	A	7/1981	Smith et al.	
4,286,465	A	9/1981	Thomae	
4,287,762	A *	9/1981	Baer	73/170.16
4,295,139	A	10/1981	Arpino	
4,298,947	A	11/1981	Tamura et al.	
4,318,076	A	3/1982	Whitfield	
4,396,149	A	8/1983	Hirsch	
4,403,218	A	9/1983	Beal et al.	
4,403,296	A	9/1983	Prosky	
4,406,550	A	9/1983	Gray	
4,428,685	A	1/1984	Lemelson et al.	
4,447,884	A	5/1984	Wada	
4,455,096	A	6/1984	Brandstedt	
4,480,253	A	10/1984	Anderson	
4,506,994	A	3/1985	Schwab	
4,521,857	A	6/1985	Reynolds, III	
4,608,565	A	8/1986	Sakamoto	
4,627,277	A	12/1986	Baer	
4,642,775	A *	2/1987	Cline et al.	701/200
4,642,785	A	2/1987	Packard et al.	
4,706,198	A	11/1987	Thurman	
4,716,411	A	12/1987	Nakamura	
4,839,645	A *	6/1989	Lill	340/870.17
4,888,986	A	12/1989	Baer et al.	
4,905,000	A	2/1990	Bateman	
4,992,942	A	2/1991	Bauerle et al.	
5,019,977	A	5/1991	LaPointe et al.	
5,023,934	A	6/1991	Wheless	
5,033,864	A	7/1991	Lasecki et al.	
5,038,607	A	8/1991	Baer et al.	
5,101,191	A	3/1992	MacFadyen et al.	
5,105,191	A	4/1992	Keedy	
5,117,359	A	5/1992	Eccles	
5,117,690	A	6/1992	Baer	
5,178,010	A	1/1993	Holzel	
5,216,275	A	6/1993	Chen	
5,223,701	A	6/1993	Batterman et al.	
5,245,874	A	9/1993	Baer	
5,255,556	A	10/1993	Lobdell	
5,265,024	A	11/1993	Crabill et al.	
5,347,274	A *	9/1994	Hassett	340/988
5,347,476	A	9/1994	McBean, Sr.	
5,355,350	A	10/1994	Bass et al.	
5,379,025	A	1/1995	Tatom et al.	
5,390,237	A	2/1995	Hoffman, Jr. et al.	
5,434,565	A	7/1995	Simon et al.	
5,444,433	A *	8/1995	Gropper	340/601
5,444,530	A	8/1995	Wang	
5,499,024	A	3/1996	Germanton et al.	
5,509,295	A	4/1996	Bartoli	
5,517,193	A *	5/1996	Allison et al.	342/26 R
5,526,268	A *	6/1996	Tkacs et al.	704/8
5,546,800	A	8/1996	Daniel	
5,568,385	A *	10/1996	Shelton	702/3
5,582,972	A *	12/1996	Lima et al.	435/6
5,583,972	A *	12/1996	Miller	345/419
5,615,118	A	3/1997	Frank	
5,689,654	A *	11/1997	Kikinis et al.	710/303
5,696,671	A	12/1997	Oliver	
5,699,244	A *	12/1997	Clark et al.	702/2
5,717,589	A *	2/1998	Thompson et al.	702/3

5,734,335	A	3/1998	Brogi et al.	
5,757,322	A *	5/1998	Ray et al.	342/460
5,781,852	A *	7/1998	Gropper	455/227
5,794,164	A	8/1998	Beckert et al.	
5,796,932	A *	8/1998	Fox et al.	1/1
5,825,814	A *	10/1998	Detwiler et al.	375/219
5,829,000	A	10/1998	Huang et al.	
5,839,094	A	11/1998	French	
5,848,378	A	12/1998	Shelton et al.	
5,850,619	A	12/1998	Rasmussen et al.	
5,898,680	A *	4/1999	Johnstone et al.	370/316
5,911,507	A	6/1999	Jaynes	
5,920,827	A	7/1999	Baer et al.	
5,938,619	A	8/1999	Dogre Cuevas	
5,943,630	A	8/1999	Busby et al.	
5,966,442	A *	10/1999	Sachdev	380/212
5,978,738	A	11/1999	Brown	
6,014,606	A *	1/2000	Tu	701/200
6,046,674	A	4/2000	Irwin et al.	
6,076,044	A	6/2000	Brown	
6,154,143	A	11/2000	Robinson	
6,177,873	B1	1/2001	Cragun	
6,181,324	B1	1/2001	Lamb et al.	
6,195,018	B1 *	2/2001	Ragle et al.	340/870.01
6,202,023	B1	3/2001	Hancock et al.	
6,243,056	B1	6/2001	Jachimowicz et al.	
6,252,505	B1	6/2001	Bade	
6,300,871	B1	10/2001	Irwin et al.	
6,311,107	B1	10/2001	Curto et al.	
6,357,292	B1	3/2002	Schultz et al.	
6,490,525	B2	12/2002	Baron, Sr. et al.	
6,597,990	B2	7/2003	Brown	

## FOREIGN PATENT DOCUMENTS

EP	0 622 639	A2	11/1994
EP	0 743 535	A1	11/1996
EP	0743 535	A1	11/1996
GB	1557183		12/1979
GB	2261536		5/1993
JP	49-31294		10/1975
JP	53-126974		4/1977
JP	51-97341		3/1978
JP	53-37732		10/1978
JP	52-84691		2/1979
JP	55-150099		11/1980
JP	54-79540		2/1981
JP	57-040621		3/1982
JP	63-204896	*	8/1988
JP	63204896	A	8/1988
JP	01-282487		11/1989
JP	02-141692		5/1990
JP	03-018789		1/1991
JP	0513420	A1	5/1991
JP	05-005788		1/1993
JP	05-005789		1/1993
JP	05-008486		1/1993
JP	05-027048		2/1993
JP	05-50389		3/1993
JP	05-052965		3/1993
JP	05-060879		3/1993
JP	05-249252	A	9/1993
JP	05-341055		12/1993
JP	05-341056		12/1993
JP	06-059054		3/1994
JP	06-088880		3/1994
JP	06-167577		6/1994
JP	06-324163		11/1994
JP	07-007769		1/1995
JP	07-012959		1/1995
JP	07-077583		3/1995
JP	07-077584		3/1995
JP	07-0129546		5/1995
JP	07-191152		7/1995
JP	08-005761		1/1996
JP	08-029545		2/1996
JP	08-029546		2/1996
JP	8095948		4/1996
JP	08-297171		11/1996
RU	2163026		10/1999

WO	WO 94/16394	7/1994
WO	WO 97/13161	4/1997
WO	WO 97/28460	8/1997
WO	WO 97/35209	9/1997
WO	WO 00/77755	12/2000

## OTHER PUBLICATIONS

WS-2000 Wireless Weather Station <http://www.rainwise.com/ws2000/index.html>, dated printed Dec. 7, 2005.

An Overview of NHC Prediction Models <http://www.srh.noaa.gov/ssd/nwpmmodel/html/nhcmmodel.htm> (pp. 1-10), date printed Jan. 28, 2005.

The only wireless indoor/outdoor temperature monitor (1 page), dated 1988.

RF Solutions Ltd. Holtek Encryption Chipset [http://www.rfsolutions.co.uk/acatalog/Holtek\\_Encryption\\_Chipset.html](http://www.rfsolutions.co.uk/acatalog/Holtek_Encryption_Chipset.html) (1 page), date printed Jan. 17, 2005.

Question No. 1307996.006 Weather Detection Device Novalynx file://C:\Documents%20and%20Settings\wsquire\Local%20Settings\Temp\NERAC1.HTM (pp. 1-19), dated printed Jul. 1, 2005. Question No. 1307996.007 Weather Detection Device Weather Forecasting file://C:\Documents%20and%20Settings\wsquire\Local%20Settings\Temp\NERAC1.HTM (pp. 1-51), dated printed Jul. 1, 2005.

100-2310 Wireless Weather Station <http://www.novalynx.com/100-2310.html>, date printed Jul. 1, 2005.

Kaplan, John, et al. "A Simple Empirical Model for Predicting the Decay of Tropical Cyclone Winds after Landfall" AOML/NOAA, Hurricane Research Division, 4301 Rickenbacker Causeway, Miami FL, 33149, pp. 2499-2512, dated Nov. 1995.

Sutherland, Robert A., "A Short Range Objective Nocturnal Temperature Forecasting Model" 1980 American Meteorological Society pp. 247-255, dated Jan. 9, 1980.

Woodley, William L., et al., "The Inference of Gate Convective Rainfall from SMS-1-Imagery", Journal of Applied Meteorology, vol. 19, pp. 388-408, Apr. 1980.

Hard-To-Find-Tools Brookstone, Jul. 27, 2005 No. 186, p. 3-9.

Advertisement "The Windindicator" Weatherwise, Inc. Dec. 1995/Jan. 1996, p. 46.

Advertisement "The WS-2000 Wireless Solar Powered Weatherstation from Rainwise" Weatherwise Apr./May 1997, p. 51.

Advertisement "Comfortstat Weather Products Instruments for Weather and Many Other Uses", date unknown.

Advertisement "Don't Just Talk About the Weather, Predict It!" Weather Wise, Oct./Nov. 1995 p. 10.

Advertisement "Don't Just Talk About The Weather Predict It" Weatherwise, Aug./Sep. 1996, p. 43.

Advertisement "Introducing the Weather Report The Complete Weather Station", Weatherwise, Aug./Sep. 1991, p. 54.

Advertisement "The Weather Report and Weather Report Logger" Weatherwise, Aug./Sep. 1995, p. 52.

Advertisement "Be Your Own Weatherman." Weather Monitor II The Professional Home Weather Station, Davis Instruments, date unknown.

Advertisement "The Talking Weather Station" Itworks, date unknown.

Advertisement "MultiFAX Card and Software", date unknown.

Advertisement "Weatherwise Photography Contest", date unknown.

Advertisement "The Fourth Dimension Displaying Weather Over Time" Weather Dimensions, Inc., date unknown.

Advertisement "The Talking Weather Station Clima Talker" Windward Systems, Inc., date unknown.

Advertisement "Monitor Weather in Real Time on Your PC/Mac" Fascinating Electronics, Inc., date unknown.

Advertisement "Serious Equipment for Serious Weather Watchers" Weather Wizard II, Weather Monitor II, Weatherlink, Davis Instruments, date unknown.

Advertisement "Why the new Ultimeter® 2000 is The World's best home weather station" Peet Bros. Company, date unknown.

AAI SMI Systems Management, Automated Surface Observing System (ASOS), dated 1992.

RadioShack, 7 Channel Same Weatherradio, Owner's Manual, Sep. 13, 2000, pp. 1-24.

No Author cited, "Funkthermometer", ELV Journal, vol. 2, 1997, pp. 2-5.

"New Temperature Sensors Ride Inside Reefer Boxes", Journal of Commerce, Transportation and Trade, Technology, p. 28, Sep. 19, 1994.

Temperature Station with Radio-Controlled Time Instruction Manual, pp. 1-9, 1997.

OS Technology AG, manufactured by IDT Technology Limited, Remote Thermometer System, THR 128, Version 1-3, Type Approval Date Oct. 13, 1997.

La Crosse Technology, WS-7054U Wireless 433 MHz Temperature Station Instruction Manual, pp. 1-34, Oct. 13, 1997.

Multi-channel In-Out Thermometer with Cable Free Sensor and RF Clock, Model: RMR 112, User's Manual, pp. 1-11, Jul. 17, 1998.

Multi-Channel In-Out Cable Free Thermometer, Model EMR812, User's Manual, pp. 1-11, 1998.

Digital Weather Forecaster with Hygrometer and RF Clock, Model BAR913, User's Manual, pp. 1-11, 1998.

Digital Weather Forecaster with Moon Phase and RF Clock, Model BAR912, User's Manual, pp. 1-12, 1998.

Digital Weather Forecaster with Remote Thermo-Sensor and Radio Controlled Clock, Model BAR112, User's Manual, pp. 1-11, 1998.

Oregon Scientific, electronic Barometer Model BA-116, Instruction Manual, pp. 1-9, 1998.

Weather Forecast Multi-Channel In-Out Thermometer with Cable Free Sensor and radio Controlled Clock, Model BAR888, User's Manual, pp. 1-13, Jul. 17, 1998.

Deluxe I/Out Remote Thermometer with Trend Chart Model JTR-168LR, User's Manual, pp. 1-9, Jul. 17, 1998.

Point Six, Inc., Point Receiver, Product Description, pp. 1-20, 2001. Point Six, Inc., Wireless Temperature/Relative-Humidity or Light Sensor Model WOWTHL, Installation and Operation Instructions, pp. 1-4, 2001.

DesignTech International, Inc., Wireless Indoor/Outdoor Thermometer, Operating Instructions, FCC ID: Elghthermotx, pp. 1-3, 2001.

Belfort Instrument, DigiWx Automated Digital Weather System, pp. 1-3, 2001.

Oregon Scientific, Mini Remote Thermometer Model MTR101, User's Manual, pp. 1-2, Feb. 16, 2001.

La Crosse Technology, Professional Remote Weather Station, Operation Manual, pp. 1-20, Jul. 23, 2002.

Brookstone WeatherSmart Indoor/Outdoor Thermometer Transmitter, User's Manual, pp. 1-20, Sep. 25, 1997.

Davis Instruments, Weather Echo & Weather Echo Plus Installation Manual, pp. 1-24, Rev. C Manual May 11, 2000.

Davis Instruments, Wireless Temperature Station, Installation Manual, pp. 1-12, Rev. A, Dec. 7, 2000.

Davis Instruments, Wireless Temperature/Humidity Station, Installation Manual, pp. 1-12, Rev. A, Oct. 19, 2001.

Davis Instrument, Wireless Vantage Pro Weather Station, Console Manual, pp. 1-64, Rev. B, Aug. 20, 2001.

ELV, WS 2010, Radio Transmission Weather Station, Operating Instruction, pp. 1-23, 1<sup>st</sup> edition, Jun. 1999.

ELV, WS 2000, Komfort-Funk-Wetterstation WS-2000, Bedienungsanleitung, pp. 1-23, Nov. 1997.

Linx Technologies, LC Series Transmitter Module Data Guide, product description, pp. 1-7, obtained Jan. 15, 2002.

Oregon Scientific, Cable Free Weather Station Model WMR112, User's Manual, pp. 1-9, obtained Jan. 10, 2002.

Oregon Scientific, Cable Free Weather Station Model WMR918, User's Manual, pp. 1-9, obtained Jan. 10, 2002.

Oregon Scientific, Cable Free Weather Station Model WMR968 User's Manual, Aug. 10, 2001.

RadioShack.Com, 433 MHz Wireless Weather Station, Cat. #:63-1016, Product description, obtained Jan. 15, 2002.

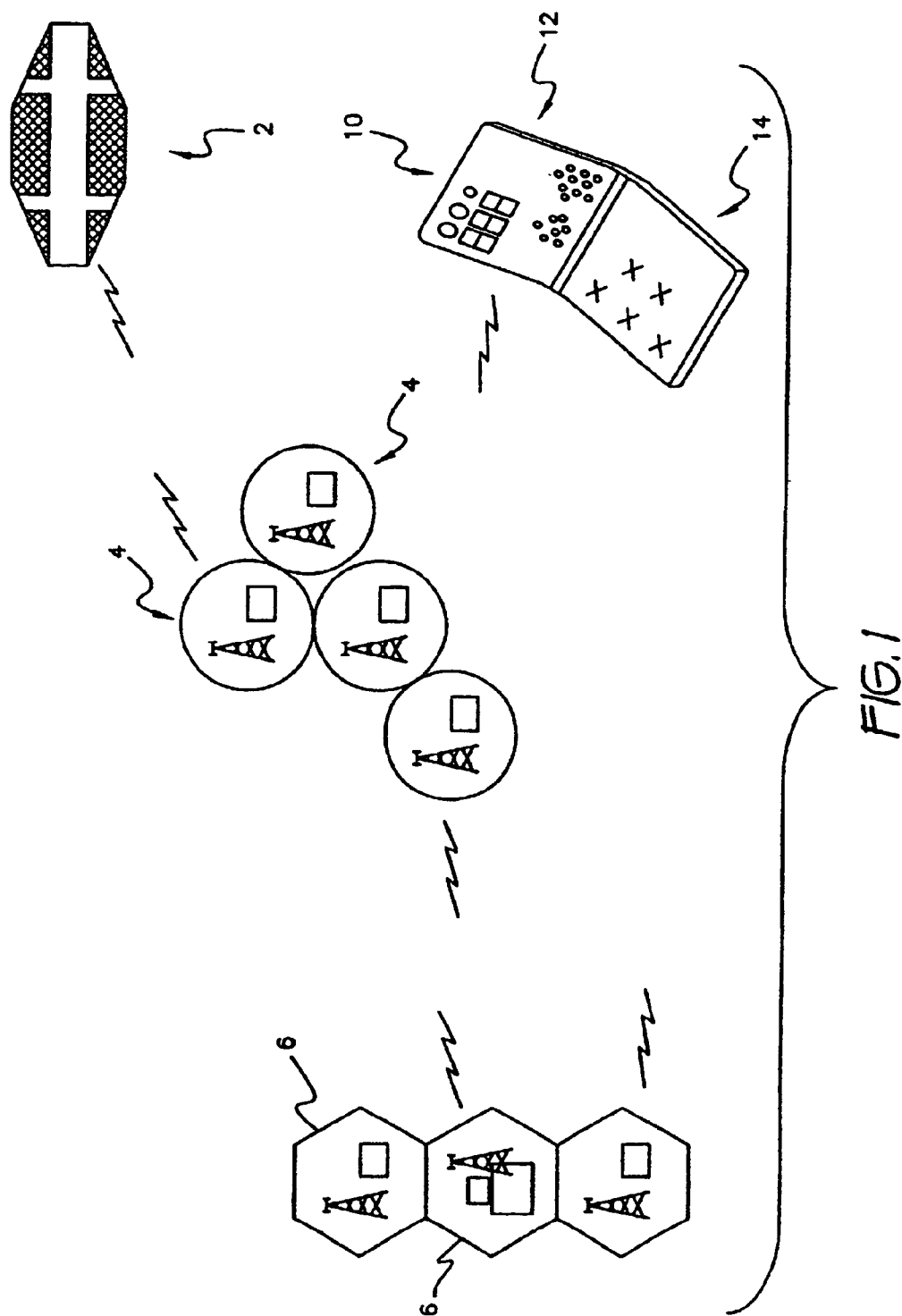
RainWise WS-2000 Weatherstation, Wireless & Solar Powered, User's Guide, pp. 1-5, obtained Jan. 15, 2002.

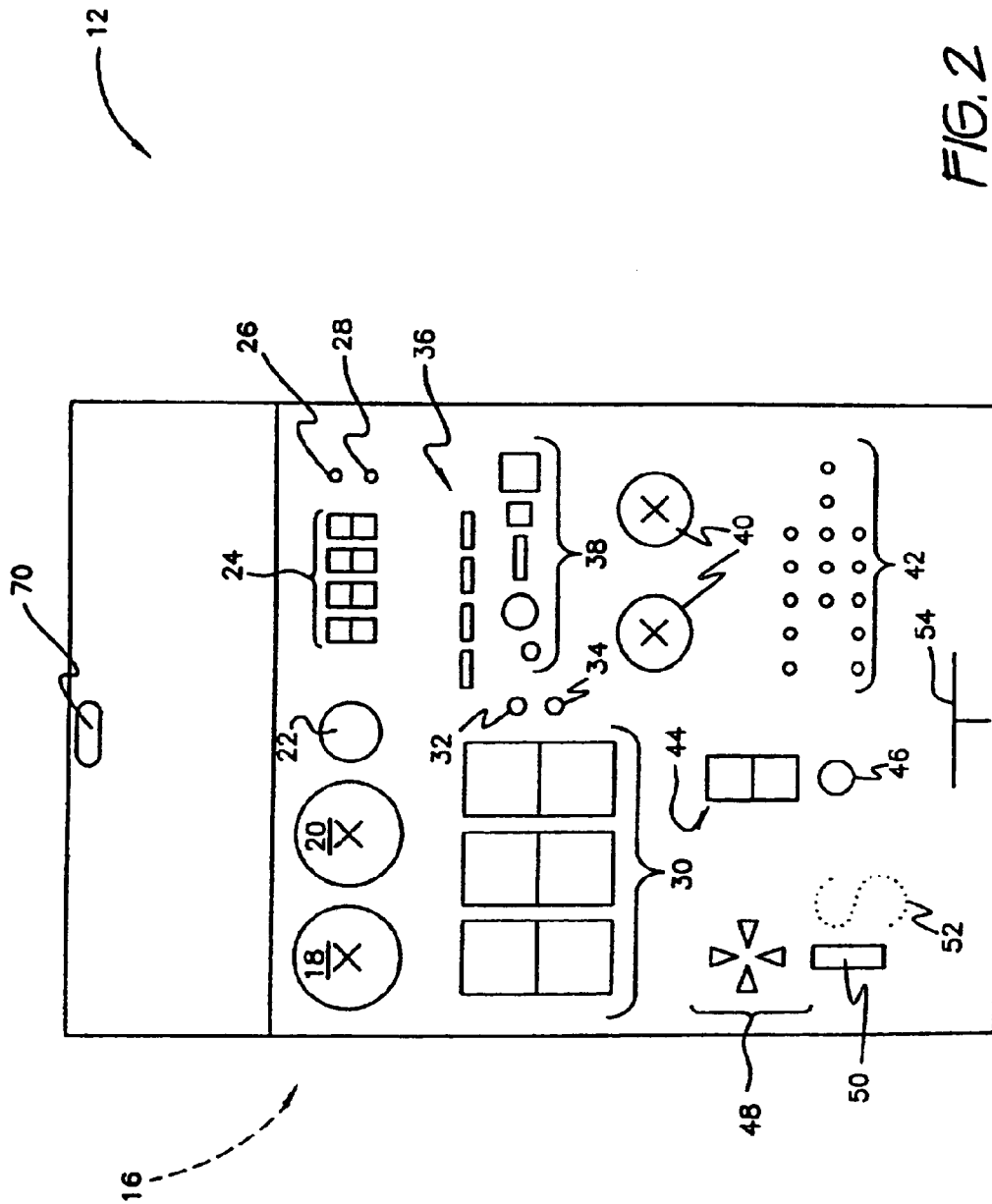
Speedtech Instruments, WS-112 Weather Station product description, Internet web page obtained Nov. 14, 2000.

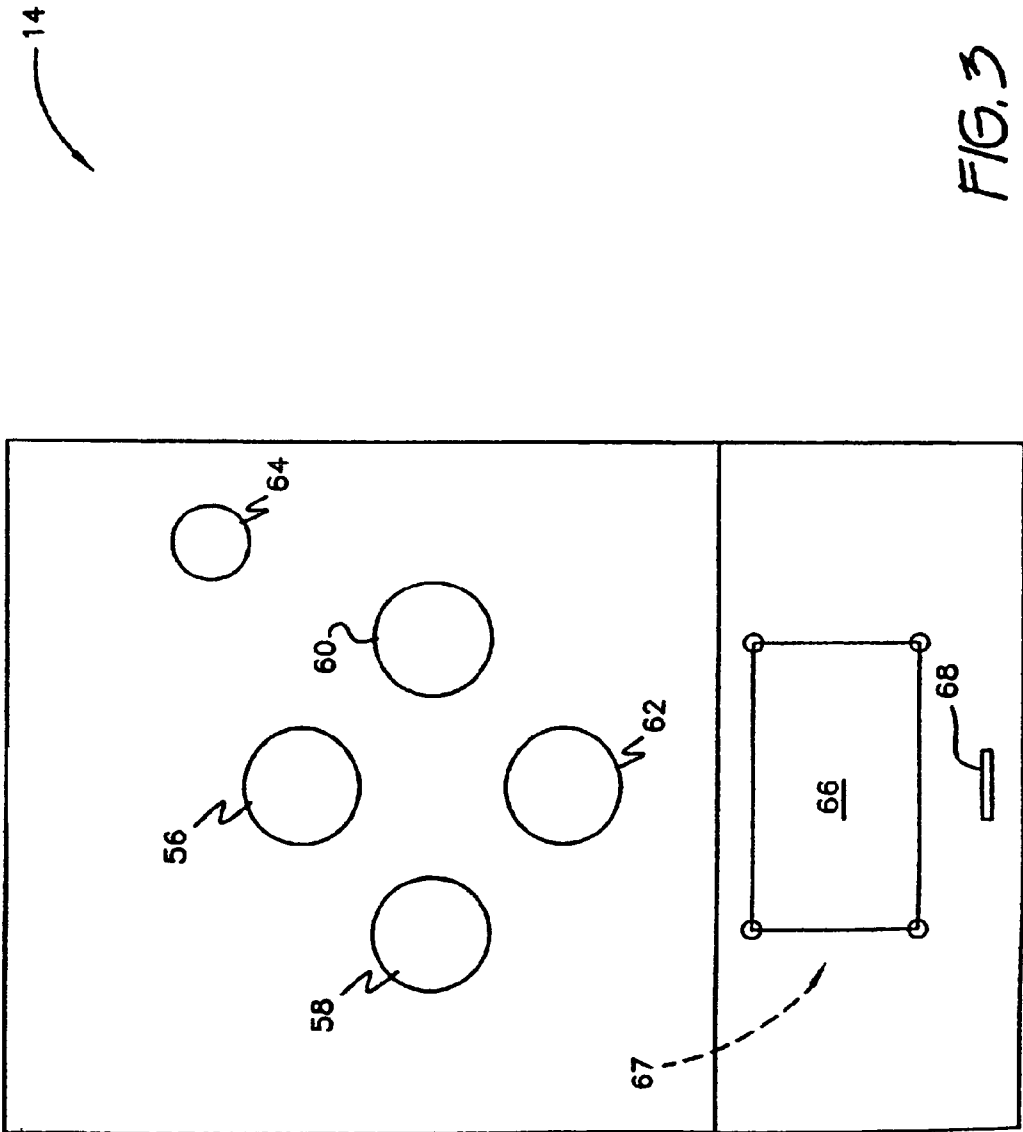
Adcon Telemetry, AgroExpert Network, Product Brochure, Oct. 20, 1996.

- Campbell Scientific, Inc., CR10X Measurement and Control System, Product Description, Jun. 1996.
- Campbell Scientific, Inc., RTMS Real-Time Monitoring Software, Product Description, Aug. 1994.
- Campbell Scientific, Inc., Campbell Scientific Weather Stations, Product Description, May 1996.
- Motorola IRRInet—Irrigation Control System and Scorpion DC Irrigation Products, Product description, 1994.
- Oltman, David, "Network News", Reprinted from California Farmer, Mar. 1996, 4 pages.
- La Crosse Technology, FCC-OMO -01RX, HFS 301-WS Operation Description, 3 pages.
- Millenium enterprise Limited, IE Headwaters Research, Product: Weather Watch/Weather Smart, RFTM Transmitter, Feb. 23, 1999.
- Pravda, News and Analysis On-Line, "South Urals Enterprise Started Producing Home Weather Stations", Aug. 26, 2002 at [http://english.pravda.ru/region/2002/08/26/35297\\_.html](http://english.pravda.ru/region/2002/08/26/35297_.html).
- Royal WS-44 Operational Manual, pp. 1-6.
- Davis Instruments, Wireless Vantage Pro & Vantage Pro Plus Stations, Specifications, 6 pages, Mar. 13, 2002.
- ELV weather station WS 7000, Ebay Article No. 1342362470, 2 pages.
- ELV weather station WS 1000, Ebay Article No. 1343024071, 3 pages.
- General Electric, Weather Station Wireless Thermometer, FCC ID BLD 0776 TX, Instruction Manual, obtained Dec. 14, 2002.
- Altitude, WE 1 Explorer Weather Station, 1 page.
- Chaney Instrument, Wireless Thermometer and Sensor, Press Releases, Images, at [www.chaneyinstrument.com/Press%20Releases/00735.html](http://www.chaneyinstrument.com/Press%20Releases/00735.html).
- Altitude, Meteo Explorer, Product Description, pp. 37-67, Sep. 17, 2001.
- General Electrical Wireless Digital Weather Station, Product sale information at [www.amazon.com/exec/obidos/tg/detail/-/B00006ANEQ/pictures/14/14/102-5656562-...](http://www.amazon.com/exec/obidos/tg/detail/-/B00006ANEQ/pictures/14/14/102-5656562-...), obtained Dec. 14, 2002.
- FCC Part 15 Subpart C Certification Report for Low Power Transmitter, Test Report No. HM108276, dated Jul. 20, 2002.
- Royal Consumer Product, FCC LSC 061STX.
- Electronics Tomorrow, FCC ID PEQ 752S90502, Preliminary Instruction Manual, Oct. 17, 2002.
- William Young, Jr. and Joe Schmidt, "PV Powering a Weather Station for Severe Weather", 7 pages obtained Dec. 15, 2002.
- Sottile, G.M. et al., "Assessment of Attitudes and Expectations of Switchable Glass Among United States Window Manufacturers", Society of Vacuum Coaters, 45<sup>th</sup> Annual Technical Conference Proceedings, p. 14, Obtained Dec. 15, 2002.
- Headwaters Research & Development, Inc. RF Thermometer, Product diagrams, 4 pages, Jun. 1997.
- Davis Instruments, Precision Weather Instruments, Product catalog 2000.
- Wind & Weather, Weather Instruments, Product catalog Spring 2001.
- Wind & Weather, Weather Instruments, Product catalog Holiday 2002.
- Davis Instruments, Precision Weather Instruments, Product catalog 2003.
- Multi-Channel In-Out Cablefree Thermo-Hygrometer, Model: BHGR618, User's Manual, 6 pages, Jul. 24, 2001.
- Wireless Rain Gauge, Model BHR616, User's Manual, 5 pages, Jul. 24, 2001.
- Weather Station, Model BHB613, User's Manual, 4 pages, Jul. 24, 2001.
- Radio Controlled Alarm Clock, Model BHM-612A, User's Manual, 4 pages, Jul. 24, 2001.
- Handar Headquarters, 555 Digitized Speech Module, Nov. 7, 1995, 1 page.
- AAI SMI, Automated Surface Observing System(ASOS), 1992, 3 pages.
- ASOS, History of Automated Observing Systems, Mar. 29, 1999, 1 page.
- Campbell Scientific, Inc., Cellular Telephone Package for Remote Datalogger Sites in the USA, 1993, 2 pages.
- Ted Reiger, Growers Network On-Line for Better Disease Control, Vineyard & Winery Management, Mar./Apr. 1995 issue, pp. 1-4.
- Handar, Inc., Telemetry Options, 1994, 1 page.
- Handar International, REMS-TALK, Handar Books Major DCB Contract In Brazil, Sep. 1995, 2 pages.
- Adcon Telemetry, Radio Network Module A730MD, 1994, 1 page.
- Campbell Scientific, Inc., Radiotelemetry Networks, May 1995, 4 pages.
- Campbell Scientific, Inc., Data Storage And Transfer, Jun. 1994, 4 pages.
- Campbell Scientific, Inc., The Campbell Update, Sep. 1994, vol. 5, No. 2, pp. 1,5.
- Campbell Scientific, Inc., The Campbell Update, Feb. 1994, vol. 5, No. 1, pp. 1,4,5.
- NOAA, The Amateur Weather Forecaster, Oct. 1979, vol. 9, No. 4, 8 Pages.
- Andrew D. Stern, et al., Bulletin of the American Meteorological Society, Identification of Aviation Weather Hazards Based On Integration of Radar and Lightning Data, Dec. 1994, vol. 75, No. 12, pp. 2269-2280.
- Elbert W. Friday, Jr., Bulletin of the American Meteorological Society, The Modernization and Associate Restructuring of the National Weather Service: An Overview, Jan. 1994, vol. 75, No. 1, pp. 43-52.
- Fred V. Brock, et al., Journal of Atmospheric and Oceanic Technology, The Oklahoma Mesonet: A Technical Overview, Feb. 1995, vol. 12, pp. 5-19.
- Thomas Rossby et al., Bulletin of the American Meteorological Society, The Volunteer Observing Ship and Future Ocean Monitoring, Jan. 1995, vol. 76, No. 1, pp. 5-11.
- David Parsons, et al., Bulletin of the American meteorological Society, The Integrated Sounding System: Description and Preliminary Observations from Toga Coare, Apr. 1994, vol. 75, No. 4, pp. 553-567.
- Stanley G. Benjamin, et al., Monthly Weather Review, An Isentropic Three-Hourly Data Assimilation System Using ACARS Aircraft Observations, Apr. 1991, vol. 119, pp. 888-906.
- Paul A. Hirschberg, et al., Bulletin of the American Meteorological society, The West Coast Picket Fence Experiment During Storm-Fest, Oct. 1995, vol. 76, No. 10, pp. 1741-1800.

\* cited by examiner







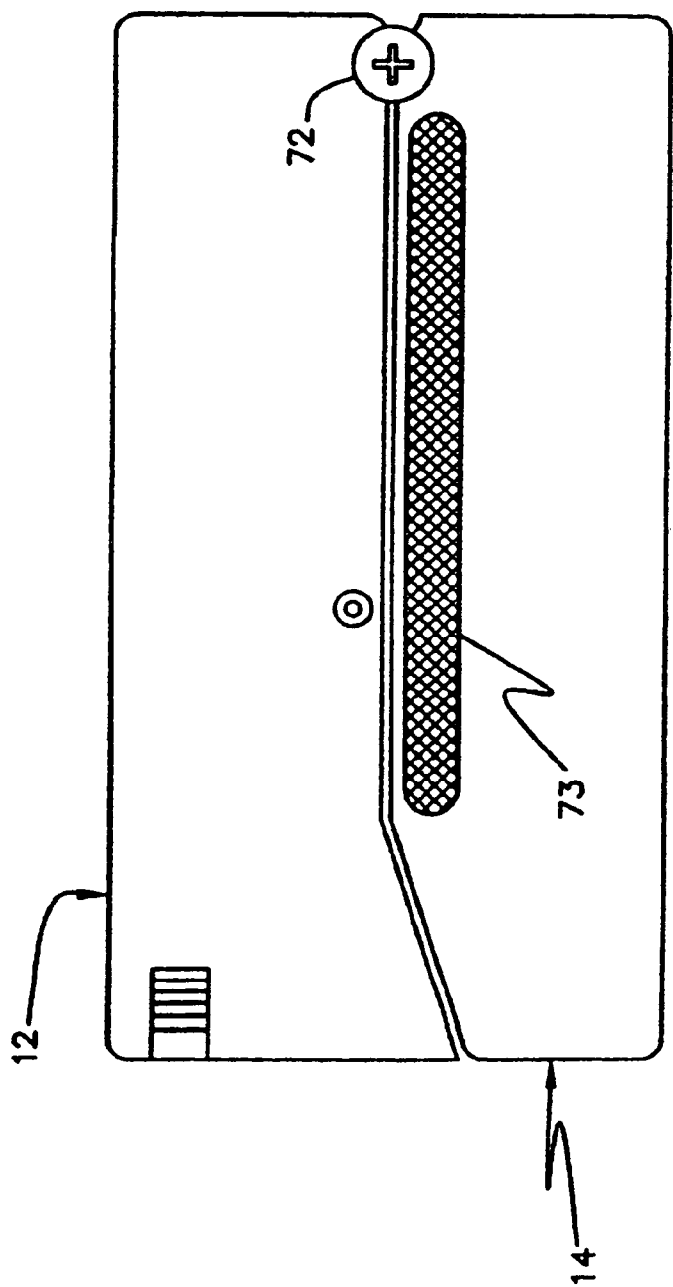


FIG. 4



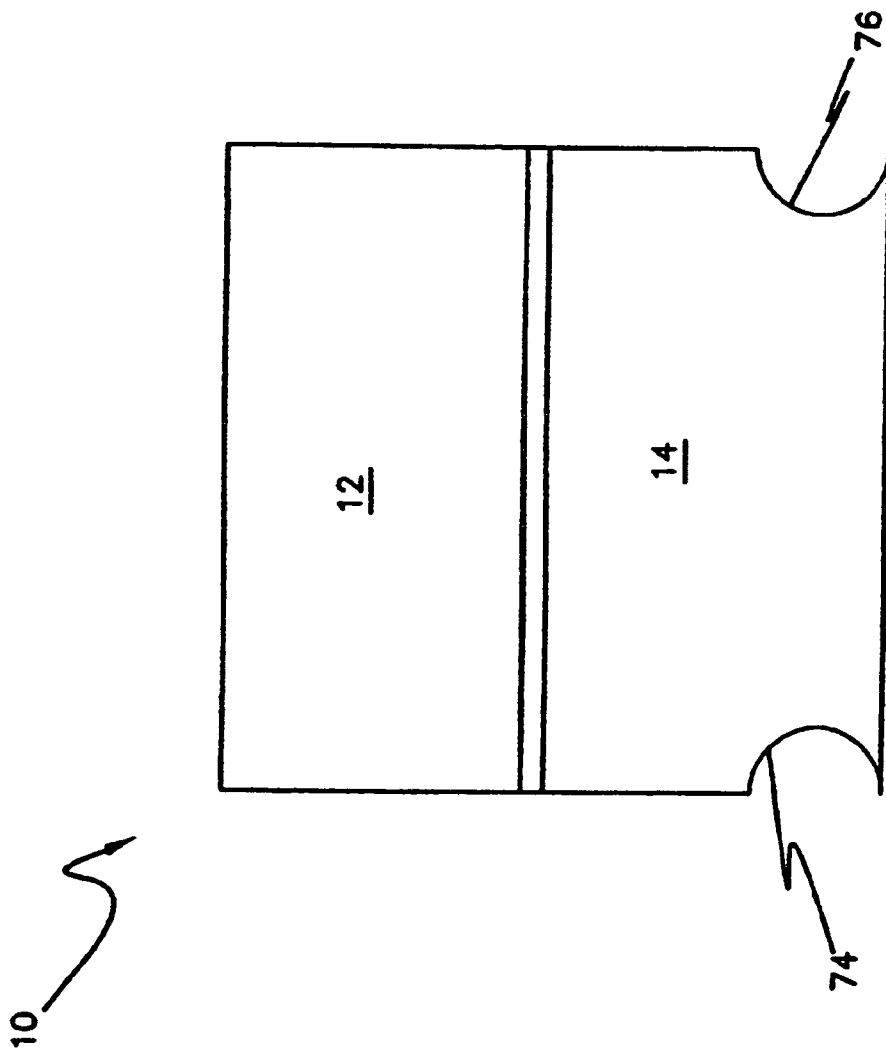
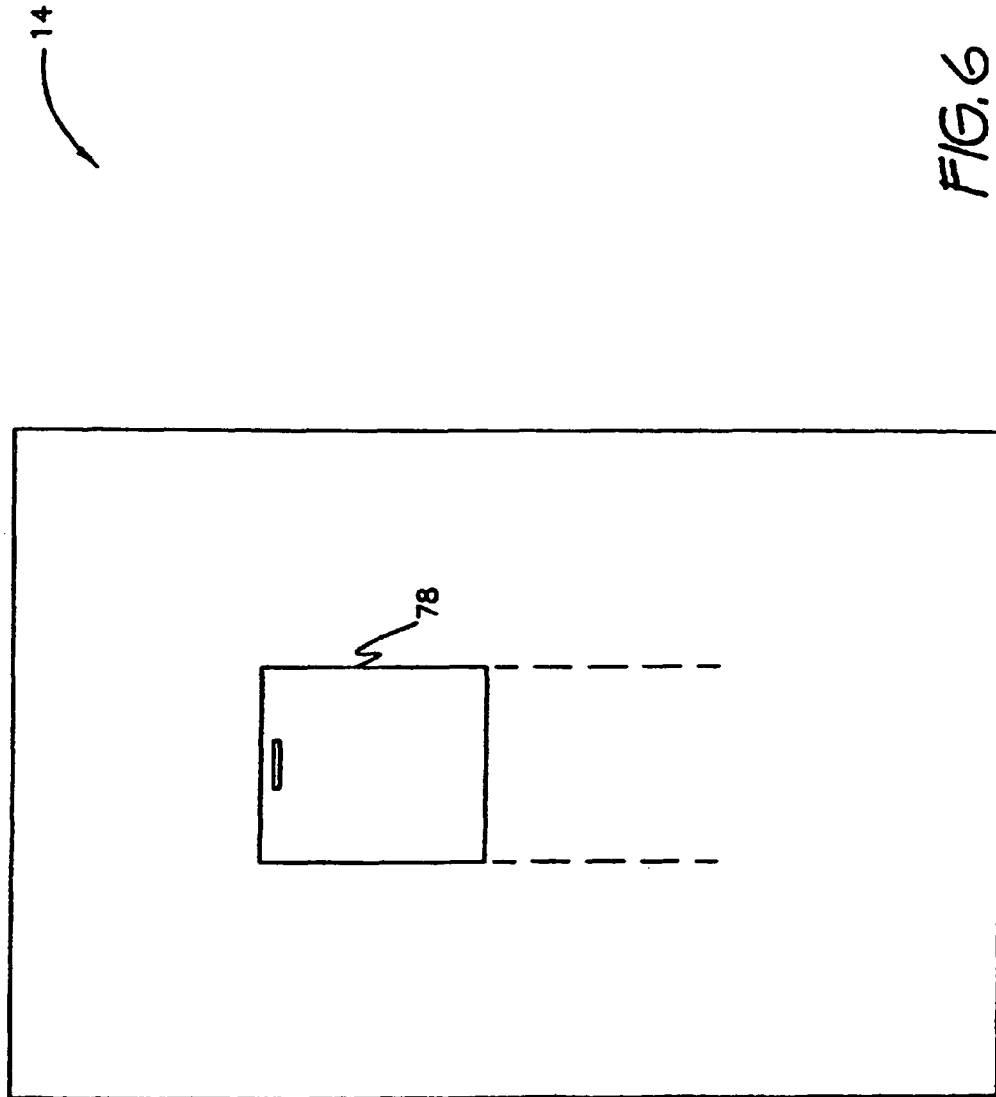
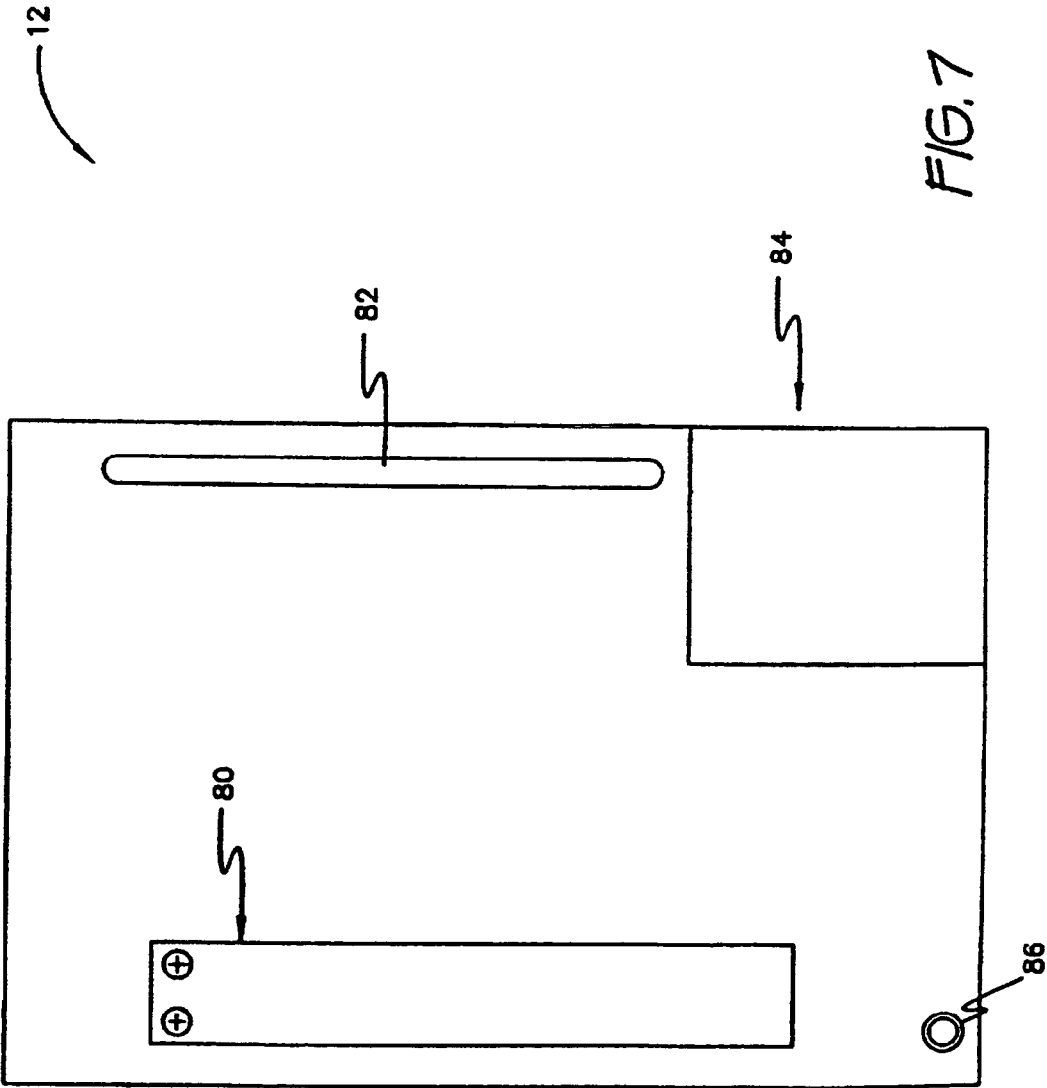
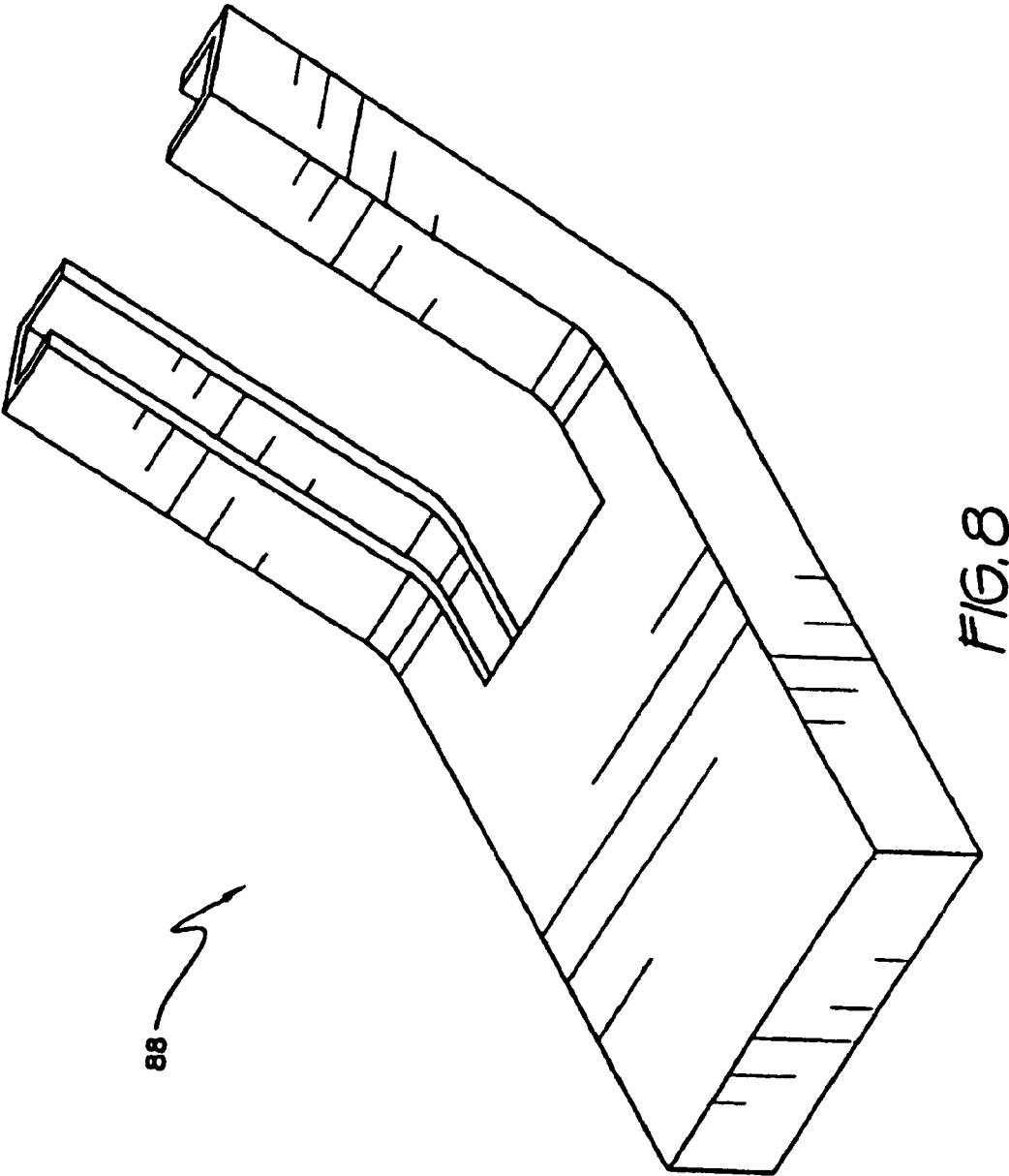


FIG. 5







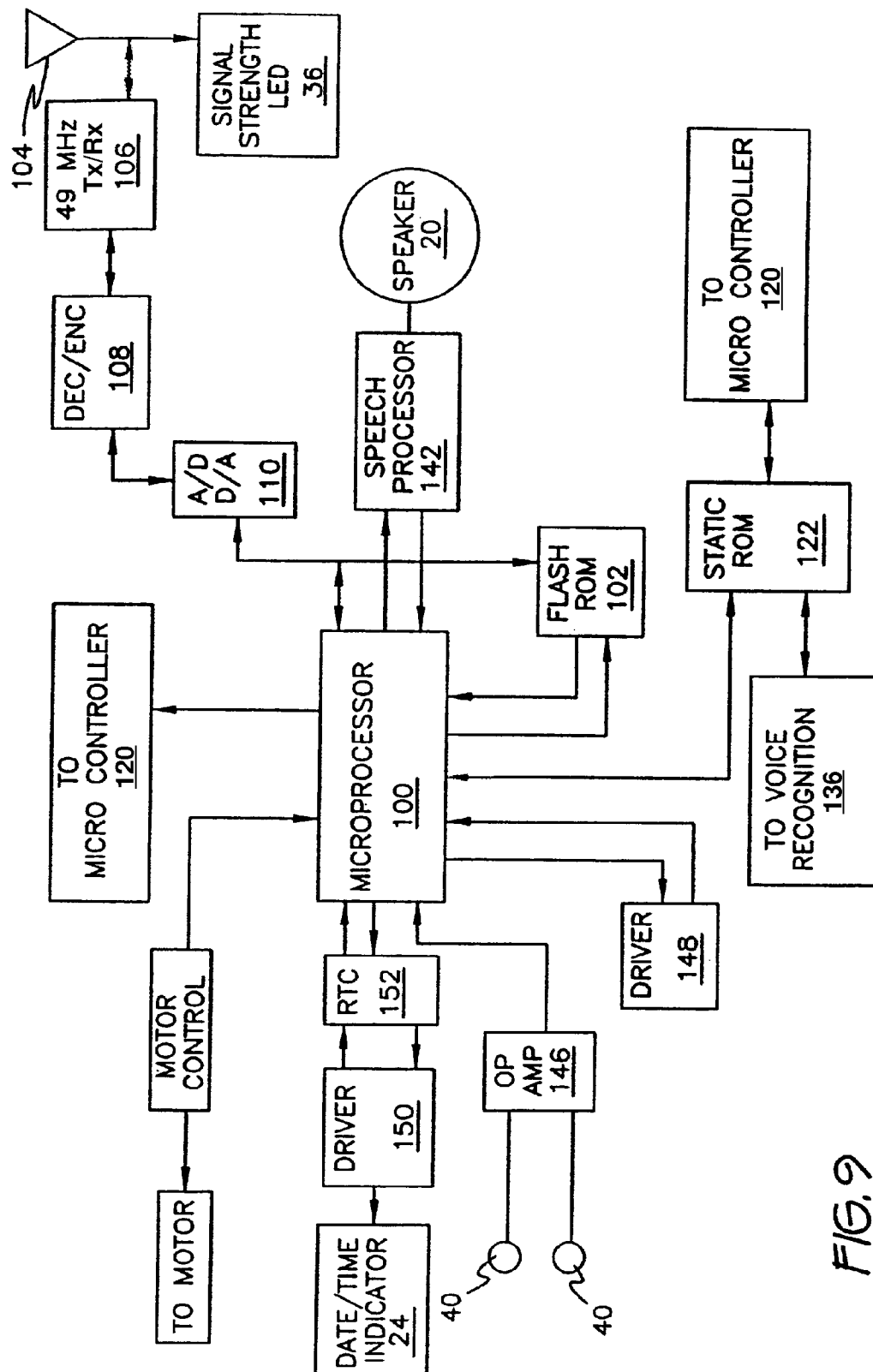


FIG. 9

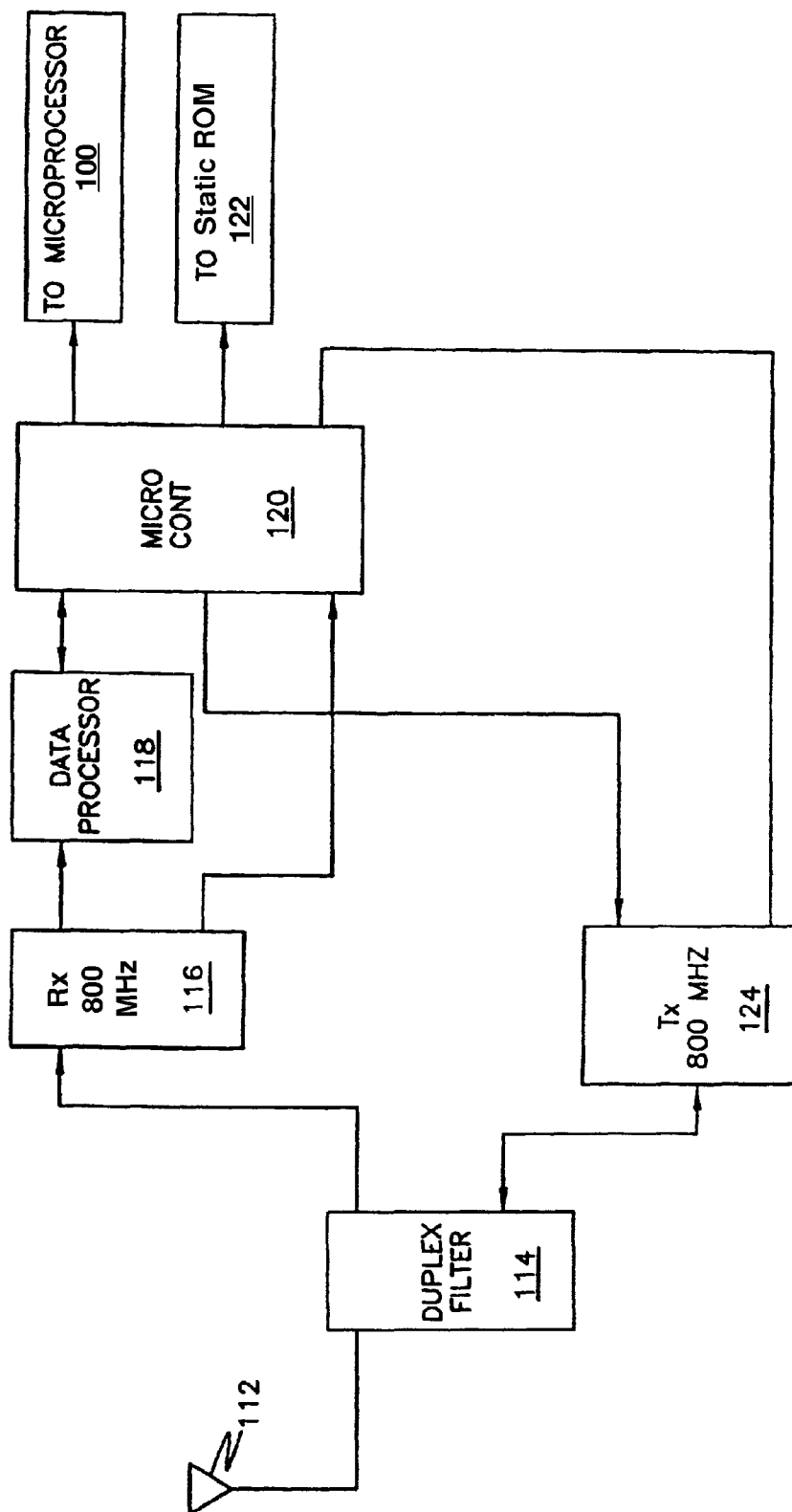


FIG. 10

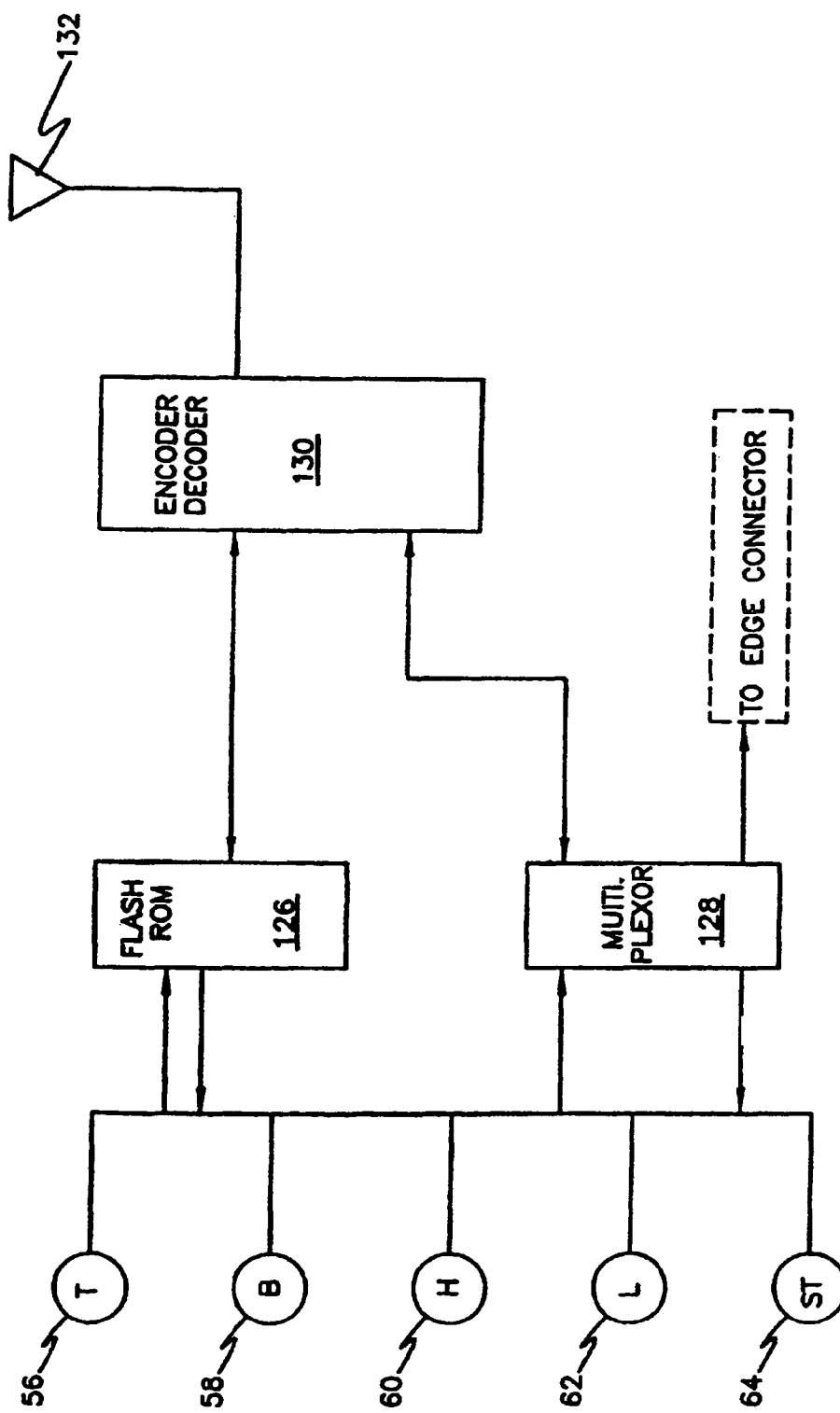


FIG. 11

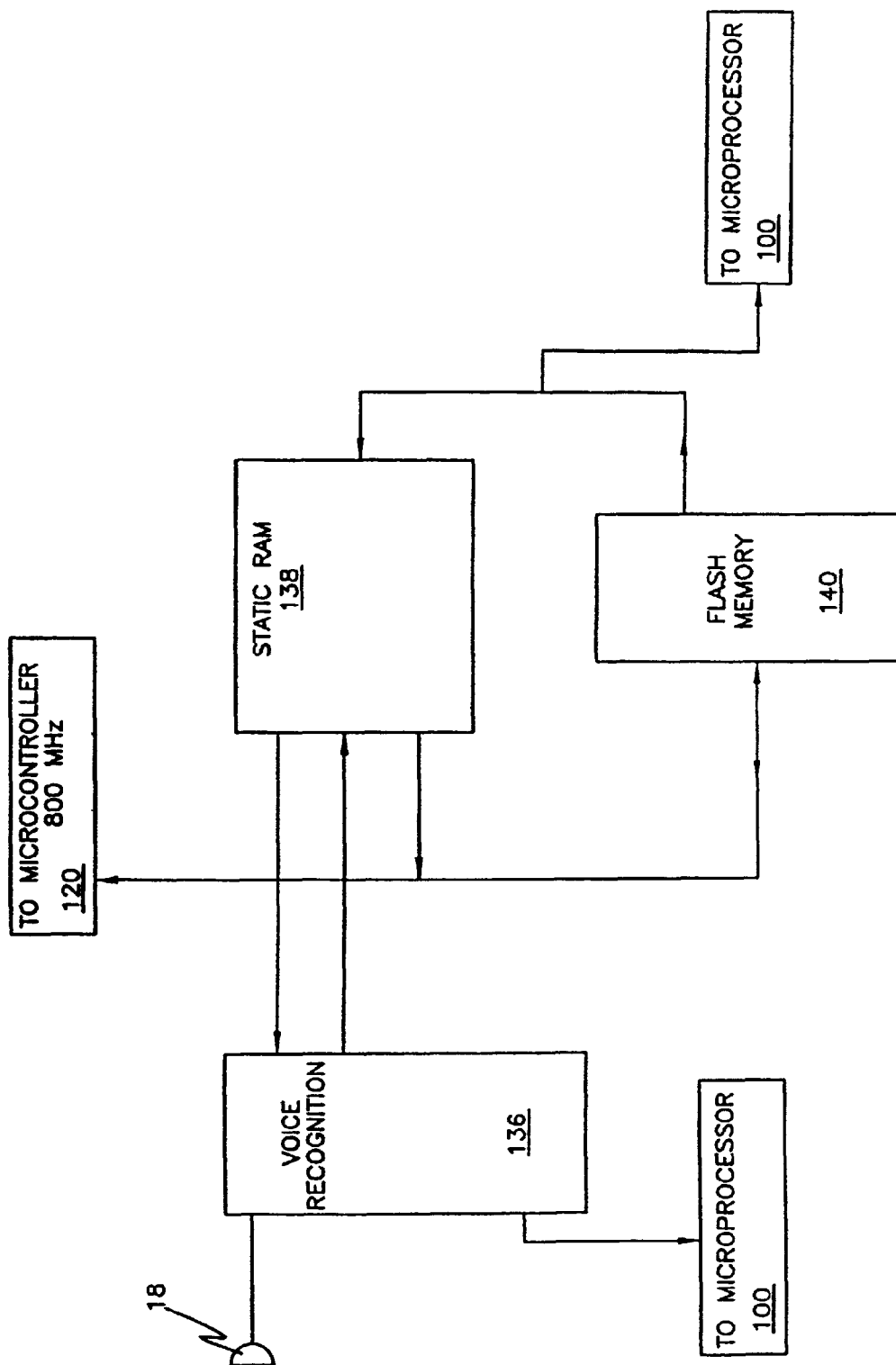


FIG. 12



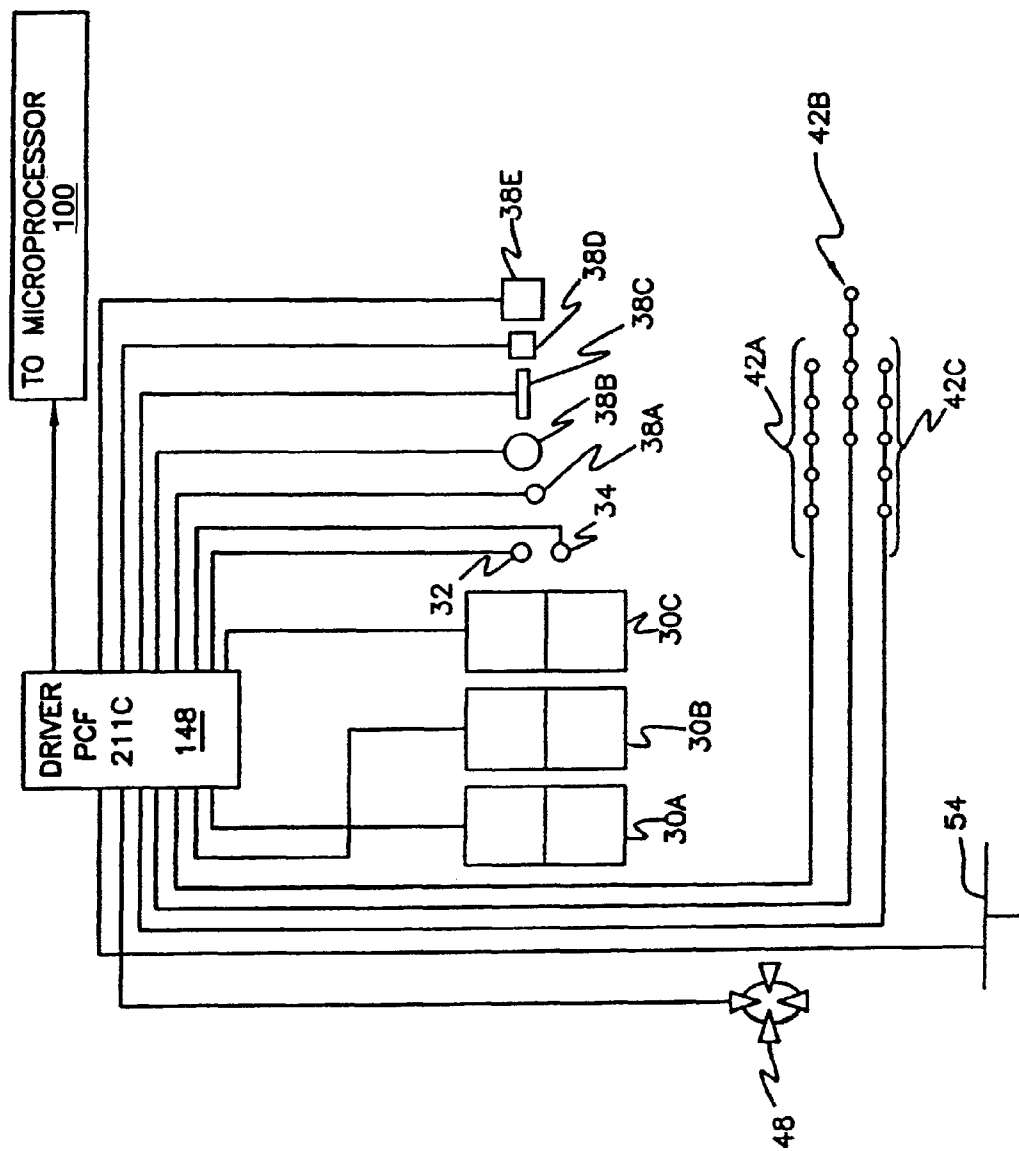


FIG. 13

## SEVERE WEATHER DETECTOR AND ALARM

**Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.**

This application is a continuation of Ser. No. 09/246,784 filed Feb. 1, 1999 now U.S. Pat. No. 6,076,044, which is continuation of Ser. No. 08/799,838 filed Feb. 13, 1997, now U.S. Pat. No. 5,978,738.

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to an unmanned weather detecting and reporting station. More specifically, the novel station has apparatus for detecting severe weather conditions such as tornadoes and lightning. The station has sensors for sensing certain critical ambient characteristics, a microprocessor for comparing sensed data to a database, a radio for receiving weather data from remote broadcasting sources, and apparatus for broadcasting inferred and reported weather patterns.

#### 2. Description of the Prior Art

Severe weather conditions can arise quite suddenly, with potentially great catastrophic consequences in financial and human cost. To avoid or minimize injury and damage from sudden, violent weather phenomena, it is desirable to be able to predict such occurrences. If weather conditions can be predicted, it is possible in many instances to take steps to mitigate undesirable consequences of the unleashed forces.

An example of a field of activity which could benefit greatly from such analysis and warning of weather conditions is that of aviation. Take off and landing are subject to disruption from extreme weather conditions. Aircraft may be rerouted or their departures and landings postponed if significant threats from weather are identified. Therefore, a need clearly exists for detection and annunciation of extreme weather conditions.

The prior art has suggested a number of weather analysis and warning systems. U.S. Pat. No. 5,105,191, issued to Edgar L. Keedy on Apr. 14, 1992, describes apparatus and method for detecting and indicating severe air disturbances such as shear winds and clear air turbulence. This invention does not address electrical phenomena, as it is primarily intended for providing information essential for take off and landing decisions for advising aircraft pilots. By contrast, the present invention considers different parameters, and detects electrical phenomena such as lightning.

Apparatus and method for identifying tornadoes are set forth in U.S. Pat. No. 5,355,350, issued to Henry E. Bass et al. on Oct. 11, 1994. The subject method employs detection and analysis of ambient sound for amplitude and frequency which may be associated with tornadoes. By contrast, the present invention considers other parameters of ambient conditions, and predicts both tornadoes and also electrical phenomena, such as lightning.

Another tornado detection scheme is seen in U.S. Pat. No. 5,379,025, issued to Frank B. Tatom et al. on Jan. 3, 1995. This invention monitors seismic waves generated by an impending tornado. By contrast, the present invention does not consider seismic phenomena, looking instead to airborne

phenomena. The present invention predicts electrical phenomena as well as tornadoes and the like.

U.S. Pat. No. 5,444,530, issued to Ting-I Wang on Aug. 22, 1995, describes a remote monitor for airfields which employs distortion of partially coherent light to detect precipitation and identify the same as rain or snow. By contrast, the present invention monitors different parameters of the atmosphere, notably temperature, humidity, barometric pressure, light, and static charge. The present invention infers presence of extreme weather conditions not analyzed by Wang, such as lightning and tornadoes.

None of the above inventions and patents, taken either singly or in combination, is seen to describe the instant invention as claimed.

### SUMMARY OF THE INVENTION

The present invention combines weather detecting apparatus for detecting local conditions with communications apparatus for obtaining information relating to distant weather conditions. From this combination, a user may ascertain current local conditions which are not apparent to the senses and information regarding imminent or otherwise relevant conditions.

This combination of information enables a person to organize his or her activities appropriately. Detection of severe weather phenomena may cause a person to take actions to protect life and property in the immediate vicinity being monitored. Alternatively, a person may select an appropriate location for travel, if avoidance of local weather is required or if previous travel plans must be modified.

The novel weather station thus both analyzes and reports weather conditions. The communication apparatus enables selection of information from any selected location on the globe, and voice synthesizing apparatus for annunciating selected weather information in a selected language. The voice synthesizing apparatus further is capable of offering operating choice selection prompts in synthesized voice form and of responding to verbal selections by the user.

Preferably, weather conditions being monitored by sensing or by gleaning information from remote radio broadcasts relate to violent or severe conditions most likely to threaten life and property. Ambient characteristics which may be sensed to infer imminent actual weather conditions include temperature, humidity, light intensity, barometric pressure, and potential of ambient static charges. These conditions may then be analyzed by a data processor integral with the weather station to predict imminent weather conditions. The results may be annunciated either by synthesized voice or by indicating lights or the like. In particular, the communications apparatus of the novel weather station is compatible with different international cellular protocols, so that data corresponding to distant weather conditions is obtained by receiving distant local weather condition broadcasts.

The actual apparatus is quite compact, and comprises two separably connected sections. For this reason, the novel weather station is readily portable and easily utilized. A receiver section includes cellular circuitry enabling communications with the external world. A sensor section contains sensors for determining local weather conditions and a microprocessor for accomplishing the various functions of the weather stations. Each of the two separably connected sections has a battery for providing power enabling operation independently of the other respective section.

Accordingly, it is a principal object of the invention to provide a portable weather station which can predict local severe weather conditions.

3

It is another object of the invention to provide a portable weather station which can obtain information relating to remote weather conditions.

It is a further object of the invention that the weather station be operated to a significant extent by vocalized prompts.

Still another object of the invention is that the weather station be compatible with a variety of languages.

An additional object of the invention is to cooperate with a variety of international cellular protocols.

It is again an object of the invention that the novel weather station comprise two manually separable sections.

Yet another object of the invention is that the novel weather station carry on board a source of power for its operation.

It is an object of the invention to provide improved elements and arrangements thereof in an apparatus for the purposes described which is inexpensive, dependable and fully effective in accomplishing its intended purposes.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

### BRIEF DESCRIPTION OF THE DRAWINGS

Various other objects, features, and attendant advantages of the present invention will become more fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views, and wherein:

FIG. 1 is an environmental, diagrammatic view of the invention.

FIG. 2 is a front plan view of one of the two separable sections of the novel weather station, illustrating control and communications apparatus located on the exterior thereof, this section being referred to as a receiver section.

FIG. 3 is a front plan view of the other of the two separable sections of the novel weather station, illustrating components mounted on the exterior thereof, this section being referred to as a sensor section.

FIG. 4 is an end elevational view of the two sections of the novel weather station united.

FIG. 5 is a side elevational view of FIG. 4.

FIG. 6 is a rear plan view of the sensor section.

FIG. 7 is a rear plan view of the receiver section.

FIG. 8 is a perspective view of an accessory for supporting the receiver section when disconnected from the sensor section.

FIG. 9 is a diagram of internal data and signal processing components of the receiver section and their interconnections.

FIG. 10 is a diagram of internal data and signal processing components relating to 800 MHz frequency communications, and is an extension of the diagram of FIG. [10] 9.

FIG. 11 is a diagram of internal data and signal processing components and associated interconnections of the sensor section.

FIG. 12 is a diagram of voice recognition circuitry components and interconnections, and is an extension of the diagram of FIG. [10] 9.

FIG. 13 is a diagram of a visual indicator driver and its driven indicators and interconnections therebetween, and is an extension of the diagram of FIG. [10] 9.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 of the drawings shows cooperation between the novel weather analyzing and reporting station 10 and a con-

4

ventional communications system utilizing cellular technology. The conventional system includes weather satellites, represented by satellite 2, radio receiving and broadcasting facilities, represented by towers 4, and cellular transmission facilities, such as Mobile Telephone Switching Offices, represented by cells 6. Satellite 4, towers 6, and cells 8 are conventional. The novel weather station 10 cooperates with these conventional facilities in gathering weather data.

Weather station 10 comprises two manually separable sections, including a receiver section 12 having radio communication apparatus therein for communicating with an external cellular radio frequency communication system, as represented by cells 6, and a sensor section 14 containing sensors for sensing local ambient weather conditions. Receiver section 12 also contains a microprocessor 16 and a source of power for operating weather station 10. Sections 12 and 14 are removably connected to one another by structure which will be further described hereinafter.

FIG. 2 shows the front panel of receiver section 12, whereon controls, visual displays, and a microphone 18 are mounted. An omnidirectional speaker 20 and a volume control 22 are disposed proximate microphone 18. A visual display 24 indicates date or time. Selector buttons 26, 28 enable selection of date or time to be indicated on display 24. A three digit display 30 is provided for indicating temperature. Selector buttons 32 and 34 select between Celsius and Fahrenheit scales. A display 36 indicates radio signal strength by progressive illumination of its individual illuminable elements.

A relative temperature display 38 indicates local temperature. A proximity sensor 40 detects whether the user is so close to weather station 10 as to interfere with reception of radio signals. An array 42 of light emitting diodes (LED) is utilized to display information regarding mode of operation. A master on-off switch 44 and a reset button 46 are provided. An emergency light 48 and a switch 50 for a purpose described hereinafter are disposed upon the front panel of receiver section 12. Switch 50 is identified by a bas relief or raised symbol 52 for the benefit of the blind. A T-LED 54 is disposed at the bottom of the front panel.

FIG. 3 shows components mounted on the exterior of sensing section 14. A temperature sensor 56, such as model MTS102, manufactured by Motorola Corporation, is provided to sense ambient temperature. A barometric pressure sensor 58, such as model MPX200A, manufactured by Motorola Corporation, senses ambient air pressure. A humidity sensor 60, such as model Minicap 2/5, manufactured by Panametrics Corporation, senses ambient humidity. A light sensor 62, which may be a model TSL235, as manufactured by Texas Instruments, senses visible light, and a static charge sensor 64, which may be model KML10/B/2, as manufactured by Phillips Semiconductor, senses ambient static potential. Sensors 56, 58, 60, 62, and 64 each incorporate a transducer for generating a data signal indicative of values of their respective sensed weather characteristics.

A closure 66 affording access to a battery 67 (concealed in FIG. 3) within sensor section 14 is also disposed upon the exterior of sensor section 14. Battery 67 is preferably a 9 volt lithium battery. A snap 68 for removably connecting sensor section 14 to receiver section 12 is provided. A corresponding second snap 70 (see FIG. 2) is located on receiver section 12.

FIG. 4 shows sections 12 and 14 connected. A screw 72 passes journaled or similarly entrapped within section 12 passes through a bored boss (not shown) formed in section 14. A screw (not shown) similar to screw 72 but oppositely directed is utilized at the opposite, concealed end of sections 12 and 14 to complement screw 72. Sections 12 and 14 are separated or disconnected by removal of these screws. A gold

5

mesh protector **73** protects an antenna (further described hereinafter) serving sensor section **14**.

FIG. **5** shows sections **12** and **14** connected, and clearly shows grooves **74**, **76** formed in sensor section **14** for manually grasping sensor section **14**.

Referring now to FIG. **6**, when separated or disconnected, sensor section **14** may be suspended from a selected external or environmental object (not shown) by the following arrangement. Sensor section **14** has a closure **78** which may be opened to reveal a chamber (not shown) and a strip of hook and loop fastener (not shown). The strip of hook and loop fastener extends outside the chamber so that it may be removably mated with a corresponding patch of hook or loop material (not shown) which has been permanently mounted on the selected environmental object. This arrangement allows temporary support of sensor section **14** in a designated location when not connected to receiver section **12**. The chamber enclosing the strip of hook and loop material is sealed to prevent ingress of moisture into sensor section **14**.

As shown in FIG. **7**, receiver section **12** has an external antenna **80**, a stepper motor controller **82**, a power supply **84**, and a standard DC power connection port **86**. Power supply **84** comprises a converter for converting 120 volt AC power to nominal 12 volt DC power and a nominal 12 volt lithium battery. Port **86** is configured to accept any one of many well known connectors. Port **86** is electrically connected to power supply **84**, so that supply **84** may be recharged when connected to an external source of power. When not so connected, receiver section **12** derives power from power supply **84**.

FIG. **8** illustrates a holder **88** for holding receiver section **12** when separated from sensor section **14**. This feature enables receiver section **12** to be supported on any convenient horizontal surface (not shown) when detached or disconnected from sensor section **14**.

Externally visible or accessible components of weather station **10** have been described thus far. Internal components and circuitry will now be described, with reference first to FIG. **9**. A microprocessor **100** processes incoming data, stores historical data relating to weather, and manages the system by responding to control commands and issuing prompts where required and providing information to the user by visual and audible outputs. Historical data recorded for a selected immediate area of usage is stored in memory of a flash ROM **102**. Microprocessor **100** may be a model 386 microprocessor by Intel Corporation, and flash ROM **102** may be model 28F400BX-T, also by Intel. A voice recognition and simulation system enables bidirectional vocal communication between weather station **10** and the user.

Incoming data is received either from sensor section **14** or by radio transmission from remote, external weather data broadcasting sources, as summarized in FIG. **1**. Data derived by sensing is received by antenna **104** and communicated to conventional 49 MHz transmission and reception circuitry **106**. Incoming signals are processed by a decoder and encoder **108**, and are digitized within an analog-to-digital and digital-to-analog converter **110**. Decoder and encoder **108** may be model HT12E/HT12D, by Holtek Corporation. Digitized data is then communicated to microprocessor **100** and flash ROM **102**.

Incoming data received from external sources at 800 MHz frequency is processed as follows, referring now to FIG. **10**. 800 MHz signals are received by antenna **112** and communicated to a duplex filter **114** which switches between transmission and reception functions. Duplex filter **114** may be model DFY2R836CR881BTJ, by Phillips Semiconductor. Data then passes to an 800 MHz receiver **116** and subsequently to a data processor **118** and to a microcontroller **120**. Data

6

processor **118** may be model UMA1000, as manufactured by Phillips Semiconductor, and microcontroller **120** may be model 8XC51RA, as manufactured by Intel. From microcontroller **120**, data is passed to a flash ROM or static ROM **122** (see FIG. **9**) and subsequently to microprocessor **100** (see FIG. **9**).

800 MHz transmissions by weather station **10** are enabled by a transmission module **124** incorporated into the 800 MHz circuitry shown in FIG. **10**. Transmission module **124** may be model BGY110D.

Internal components of sensor section **14** are illustrated in FIG. **11**. Sensors **56**, **58**, **60**, **62**, **64** communicate with a flash ROM **126** and with a multiplexer **128**, which is connected to an encoder and decoder **130**. Output of encoder and decoder **130** is transmitted by antenna **132** for reception by antenna **104** of receiving unit **12** (see FIG. **9**). Antenna **132** is protected by gold mesh protector **73** shown in FIG. **4**. Flash ROM **126** may be model 28F010-15, as manufactured by Intel, and multiplexer **128** may be a model 74151. Encoder and decoder **130** may be a model HT12E/HT12D, as manufactured by Holtek.

Because sections **12** and **14** are separable, each has an internal antenna **104** (see FIG. **9**) or **132** for enabling mutual communication. With the exception of sensors **56**, **58**, **60**, **62**, **64**, antenna **132** and its associated circuitry, and battery **67**, all internal components described thus far are located in receiving section **12**.

Referring now to FIG. **12**, voice simulation and recognition apparatus is also contained within receiver section **12**. voice recognition apparatus includes microphone **18** which is connected to a voice recognition device **136**. Microphone **18** is located on receiver section **12** in any suitable location for receiving responses and commands spoken by the user. Device **136** is a model UPD 77501, as manufactured by NEC, and is a high quality speech recording and playback LSI. Device **136** communicates with a static RAM device **138** and a flash ROM memory device **140**. Static RAM device **138** is preferably a 1 meg, 8 byte 128x8 RAM device, model MCM 6726, as manufactured by Motorola. Flash ROM device **140** is preferably a model 28F400BX-T, as manufactured by Intel.

Voice simulation apparatus is shown in FIG. **9**, and includes a 1 Megabyte speech data ROM integrated chip, or digital speech processor **142**. Speech processor **142** is a stand alone masked ROM device, and is preferably a model 7758A, as manufactured by NEC. Output of speech processor **142** is projected from speaker **20**.

Also shown in FIG. **9** are operative connection of proximity sensors **40** to microprocessor **100** through an operational amplifier **146**, and drivers **148**, **150** for driving visual indicators and alarm. Driver **150** is associated with a real time clock **152**, and drives date and time indicator **24**.

Driver **148** drives many of the visual indicators disposed upon the front exterior surface of receiving section **12**. These connections are shown in detail in FIG. **13**. In FIG. **13**, it will be seen that display **30** comprises three independent display panels **30A**, **30B**, and **30C**, each capable of displaying a different symbol. Similarly, relative temperature display **38** indicates temperature in several individual steps or range increments by illuminating individual illuminable elements **38A**, **38B**, **38C**, **38D**, **38E**.

Array **42** of LEDs comprises three independent groups of LEDs **42A**, **42B**, **42C**. This array indicates mode of operation with respect to gathering of broadcast weather data relating to local weather (LEDs **42A**), local continent (LEDs **42B**), or international continent (LEDs **42C**).

Operation of weather station **10** will now be described. Weather station **10** may be operated in any one of three

modes. In a local reporting mode, weather station **10** reports conditions, either with sections **12** and **14** connected or separated. The local reporting mode is indicated by illumination of LEDs **42A**. A local continent or country reporting mode is signalled by illumination of LEDs **42B**. An international or global reporting mode is signalled by illumination of LEDs **42C**. Local reporting may proceed with or without connection of sensor section **14**. If connected and delivering data, LED **54** will illuminate.

To operate, it is required that switch **42** be on, that proximity sensors **40** detect a person disposed immediately in front of receiver section **12**, and that an appropriate voice command or radio frequency signal be received. When the first two conditions are satisfied, reception of a radio signal indicative of severe weather conditions will initiate operation. Microprocessor **100** (see FIG. 9) is provided with a five year history of weather data for the geographic area selected to be monitored, and with algorithms for comparing input data to stored data to determine correlation to severe weather conditions. These weather conditions include tornadoes, high winds, lightning, high level of rainfall, among others. Correlation of input data with a severe weather condition will cause operation.

If no such correlation is received and the first two conditions for operation are present, a control algorithm will initiate a series of vocalized prompts generated by speech processor **142** and speaker **20** (see FIG. 9). When a verbal response is received, recognized, and correlated to predetermined responses by microphone **18** and associated voice recognition circuitry shown in FIG. 12, commands are executed and further verbal prompts, as appropriate, are generated.

One selection that is made by the user responsive to a prompt is the geographic area that is to be regarded as local. This information may be provided by the user verbally by responding with the latitude and longitude of the selected local area, or with a nearby city and state, according to initial programming of weather station **10**.

Certain verbal prompts occur only during initial preparation of weather station **10**, and are programmed such that once answered, they will not be repeated at each usage of weather station **10**. These prompts concern language selection, as will be discussed hereinafter, and intervals and nature of audible alarms which sound automatically when microprocessor **100** determines that there is a high probability of severe weather conditions. A value relating to threshold of probability of severe conditions may also be included in prompts for initially preparing weather station **10**.

When operating in the local reporting mode, sensors **56**, **58**, **60**, **62**, **64** periodically sense conditions and transmit collected data to microprocessor **100** for assessment of conditions and annunciation of the same. Routine information such as temperature is indicated on display **30** or relative temperature display **38**, which indicates a range rather than specific values, as indicated on display **30**. If severe conditions are calculated as probable, an audible alarm in the form of a high pitched tone or a simulated voice message in the selected language is sounded from speaker **20**. After the user responds to predetermined verbal prompts to assure that correct selections are made, sensing becomes dormant and will reactivate at predetermined intervals, such as every fifteen minutes.

Memory of weather station **10** is loaded with data corresponding to a selected historic base time period, such as the previous five years. Real time weather data received by antenna **104** is reconfigured by digital-to-analog converter **110** and is routed to microprocessor **100** and to flash ROM

**102**. Analysis by comparison to known or pre-calculated conditions will generate outputs conducted to visual indicators shown in FIG. 2 and, if predetermined threshold values are met, sound an alarm as described above. In addition to an audible alarm, emergency indicator **48** will illuminate.

Voice recognition utilizes adaptive differential pulse code modulation (ADPCM). Speech processor **142** features low-pass filtering microphone amplifiers with a variable fixed gain ADPCM coder and decoder. Voice recognition device **136** receives a pulse code modulated signal from microphone **18**. The signal is low pass filtered, converted to a ten bit digital value and converted to ADPCM. After conversion by the analog-to-digital converter **110**, the signal is encoded to a shortened ADPCM code, such as two, three, or four bits. From the analysis circuit, the data is routed to external memory utilizing static RAM device **138** and associated flash ROM device **140**. Data is retrieved when microprocessor addresses the voice recognition circuitry.

In the local reporting mode, LEDs **42A** (see FIG. 13) will be illuminated. LED **38E** is preferably red in color, and will indicate temperatures exceeding ninety degrees Fahrenheit. LED **38D** is preferably amber in color, and indicates temperatures in a range of seventy to ninety degrees. LED **38C** is preferably green in color, and indicates temperatures in a range of fifty to seventy degrees. LED **38B** is preferably blue in color, and indicates temperatures in a range of thirty to fifty degrees. LED **38A** is preferably red in color and indicates temperatures below thirty degrees Fahrenheit.

LED **54** will illuminate when the local reporting mode is in operation. This serves as warning that only local weather data is being reported.

To select a reporting mode, or to change an existing selection, switch **42** is switched to on, or switched to off followed by switching to on, if weather station **10** is already operating. Predetermined simulated voice prompts will request responses in a preselected code. This may comprise a letter or number corresponding to a particular selection, rather than a value or location being selected.

Language of communication is selected at this time. When a language prompt is answered in a preferred language, all responses by the user thereafter will be treated in the selected language, and all simulated voice prompts will be issued in the selected language. It is preferred that the memory of weather station **10** be loaded to include a range of languages for selection. Preferred languages include English, Spanish, German, French, Russian, Arabic, one or more Chinese dialects, Italian, and Japanese.

Within the U.S., NOAA Weather Radio is monitored for the standard 1050 Hz tone employed by the NOAA to indicate an emergency. Detection of this tone preferably triggers an appropriate alarm and may initiate a simulated vocal query to monitor specific severe conditions, such as identified existing hurricanes, tropical storms, and the like.

When selecting the international or global reporting mode, connection with the appropriate remote cellular protocol is arranged by prompts. Memory of weather station **10** is loaded with available international protocols to assure reception of the requested data.

After certain necessary selections have been made, weather station **10** will issue a general query as to other requirements not addressed by prompts. These may be specified by utilizing a prearranged code or signal.

When initial prompts have been satisfactorily answered, a vocal signal will be issued. Preferably, this signal will be a distinctive sound, such as the Boatswain's Whistle. The Boatswain's Whistle is a melody employed by the U.S. Naval Fleet.

It is to be understood that the present invention is not limited to the embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

I claim:

**[1. A weather station for monitoring weather conditions at least one remote location comprising:**

a detachable, portable, battery-powered and hand-holdable weather station unit situated at the at least one remote location including:

a microprocessor;

at least one data sensor coupled to the microprocessor for generating a data signal representative of weather conditions at the at least one remote location;

a transmitter coupled to the microprocessor for transmitting said data signal;

an antenna coupled to the transmitter; and

a detachable, portable, battery powered and hand holdable weather station receiver for receiving and displaying the weather conditions received from said weather station unit.]

**[2. The weather station of claim 1 wherein the data sensor monitors the weather data and wherein the transmitter is configured to wirelessly transmit a data signal, said data signal being representative of the weather data monitored at the at least one location.]**

**[3. The weather station of claim 1 wherein the data sensor senses temperature.]**

**[4. The weather station of claim 1 wherein the data sensor senses wind speed.]**

**[5. The weather station of claim 1 wherein the data sensor senses rain.]**

**[6. The weather station of claim 1 wherein the data sensor senses barometric pressure.]**

**[7. The weather station of claim 1 wherein the data sensor senses ambient light.]**

**[8. The weather station of claim 1 wherein the data sensor senses static charge.]**

**[9. The weather station of claim 1 wherein the data sensor senses humidity.]**

**[10. The weather station of claim 1 wherein the receiver comprises an indicating circuit configured to indicate a temperature trend.]**

**[11. The weather station of claim 1 wherein the receiver further comprises an alarm configured to indicate an alarm condition responsive to a comparison of the data signal received by the receiver with a predetermined threshold value.]**

**[12. The weather station of claim 1 wherein the receiver further comprises an indicating circuit configured to indicate a signal strength of the data signal being received by the receiver.]**

**[13. The weather station of claim 1 wherein the receiver is configured to receive a telemetry signal from a NOAA weather radio.]**

**[14. The weather station of claim 1 further comprising an alarm.]**

**[15. The weather station of claim 14 wherein the alarm is triggered when a probability of a predetermined weather condition is detected.]**

**[16. A weather station for monitoring weather conditions at least one remote location comprising:**

a portable, battery-powered and hand-holdable weather station unit situated at the at least one remote location including:

a microprocessor;

at least one data sensor coupled to the microprocessor for sensing at least one weather condition and generating a data signal representative of the at least one weather condition condition at the at least one remote location;

a transmitter coupled to the at least one data sensor for transmitting said data signal; and

an antenna coupled to the transmitter;

a portable, battery powered and hand holdable receiver configured to receive the data signal comprising:

a storage device configured to store at least one of a plurality of measured remote weather conditions;

a processor configured to generate a prediction of a weather condition, the prediction being based on the data signal received by the receiver and at least one of the measured weather conditions stored in the storage device; and

an indicating circuit configured to indicate the prediction.]

**[17. The weather station of claim 16 wherein the receiver further comprises an interface configured to receive a latitude coordinate.]**

**[18. The weather station of claim 16 wherein the receiver further comprises an interface configured to receive a longitude coordinate.]**

**[19. The weather station of claim 16 wherein the receiver further comprises an interface configured to receive a geographic area latitude position.]**

**[20. The weather station of claim 16 wherein the receiver further comprises an interface configured to receive a geographic area longitude position.]**

**[21. The weather station of claim 16 wherein the processor is coupled to the receiver and storage device and configured to generate a prediction of a potential remote weather condition, the prediction being based on the data signal received by the weather station receiver and at least one of the measured weather conditions compared to said stored data.]**

**[22. The weather station of claim 16 wherein the prediction of a weather condition is based on the received data signal and at least one of the measured weather conditions stored in the storage device.]**

**[23. The weather station of claim 16 wherein the indicating circuit is configured to indicate a temperature trend.]**

**[24. The weather station of claim 16 wherein the receiver further comprises an alarm configured to indicate an alarm condition responsive to a comparison of the data signal received by the receiver with a predetermined threshold value.]**

**[25. The weather station of claim 16 wherein the indicating circuit comprises a signal strength indicator configured to indicate a signal strength of the data signal being received by the receiver.]**

**[26. The weather station of claim 1 wherein the receiver is configured to receive a telemetry signal from a NOAA weather radio.]**

**[27. The weather station of claim 14 wherein the alarm is triggered when a predetermined weather condition is detected.]**

**[28. The weather station of claim 16 further comprising an alarm.]**

**[29. The weather station of claim 28 wherein the alarm is triggered when a predetermined weather condition is detected.]**

**[30. The weather station of claim 28 wherein the alarm is triggered when a probability of a predetermined weather condition is detected.]**

11

31. An apparatus comprising:  
 a readily portable, battery-powered and hand-holdable weather display unit including:  
 a first receiver configured for receiving data via a first radio frequency signal from a source;  
 a second receiver configured for receiving a second radio frequency signal from a cellular telephone network and compatible with an international cellular protocol, wherein the cellular telephone network is different than the source;  
 a display, including a prompt, and configured to display a date and a time;  
 a processing device configured for a) enabling display of information based on received data of at least one of the first radio frequency signal and the second radio frequency signal via the prompt, b) selecting between a first mode of operation that displays first weather conditions including temperature at a first location and a second mode of operation that displays second weather conditions at a second location different than the first location, c) and displaying a prediction of a future weather condition.
32. The apparatus of claim 31, wherein displaying the prediction of a future weather condition occurs during the display of the first weather conditions.
33. The apparatus of claim 31, wherein the prompt enables a location to be selected, the first weather conditions are weather conditions for the location, and at least one of the first weather conditions is based on the received data of the first radio frequency signal.
34. The apparatus of claim 31, wherein the international cellular protocol operates about a fixed frequency.
35. The apparatus of claim 31, further comprising:  
 a readily portable, battery-powered and hand-holdable weather station unit including:  
 at least one data sensor for generating a data signal representative of weather conditions at the at least one remote location; and  
 a transmitter for transmitting said data signal via the first radio frequency signal.
36. A portable weather station comprising:  
 (a) a portable, battery powered sensor unit, said sensor unit comprising a hand-holdable housing on or in which is provided:  
 a sensor for detecting a local area weather condition;  
 sensor unit circuitry for periodically sampling and wirelessly transmitting digital data of the local area weather condition sensed by said sensor; and  
 a battery power source for powering said sensor unit circuitry; and  
 (b) a portable, battery-powered weather station receiver unit, for use with said sensor unit when positioned in a general local area of said sensor unit, said weather station receiver unit including a hand-holdable housing on or in which is provided:  
 first radio frequency receiving circuitry for receiving, from said portable, battery powered sensor unit, said periodically sampled and wirelessly transmitted digital data of said local area weather condition;  
 second radio frequency receiving circuitry for receiving a separate wireless transmission of further digital data transmitted by a remote source which is relatively remotely located in relation to said sensor unit and weather station receiver unit;  
 at least one data storage device;  
 at least one visual display, for displaying numeric and other information-conveying symbols or indications;

12

- microprocessor circuitry coupled to the first and second receiving circuits and said at least one data storage device, for receiving said digital data of said local area weather condition and said further digital data, for storing, in said at least one data storage device, said digital data of said local weather condition and said further digital data, and for outputting to said at least one visual display information of said digital data of said local weather condition and said further digital data; and  
 a battery power source for powering said weather station receiver unit.
37. A portable weather station according to claim 36, wherein said separate wireless transmission receivable by said second radio frequency circuitry comprises a transmission over a wireless network.
38. A portable weather station according to claim 36, wherein said microprocessor circuitry is configured to receive and process weather related data from the separate wireless transmission using a protocol compatible with the transmission, and for selecting weather information from a selected region on the globe, the microprocessor being further configured to process encoded weather data.
39. A portable weather station according to claim 36, said weather station receiver unit further comprising a user interface for selecting a mode of operation from a plurality of modes of operation, each mode of operation in the plurality of modes of operation defining different operating characteristics for the weather station receiver unit.
40. An apparatus comprising:  
 a readily portable, battery-powered and hand-holdable weather display unit including:  
 a first receiver configured for receiving weather conditions from a weather station unit;  
 a second receiver configured for receiving a signal from a remote source that is different than the weather station unit;  
 a circuit configured for receiving data indicating presence of a user at the weather display unit;  
 a display; and  
 a processing device configured to:  
 receive the weather conditions from the first receiver, receive data representative of the signal from the second receiver,  
 receive the data indicating presence of a user at the weather display unit,  
 based on the data indicating presence of a user at the weather display unit, determine that the weather display unit is to operate in a mode that displays the weather conditions, and  
 in response to the determination, display the weather conditions.
41. The apparatus of claim 40, wherein display of a prediction of a future weather condition occurs during the display of the weather conditions.
42. The apparatus of claim 40, further comprising:  
 the weather station unit, wherein the weather station unit is configured to be readily portable, battery-powered and hand-holdable, and the weather station unit includes:  
 at least one data sensor for sensing the weather conditions; and  
 a transmitter for transmitting the weather conditions to the weather display unit via a digital signal.
43. An apparatus comprising:  
 a readily portable, battery-powered and hand-holdable weather display unit including:

## 13

- a first receiver configured for receiving weather conditions from a weather station unit;  
 a second receiver configured for receiving a signal from a remote source that is different than the weather station unit;  
 a display including a prompt; and  
 a processing device configured to:  
   receive data representative of the signal from the second receiver;  
   receive data from a user of the weather display unit via the prompt, the received data indicating a selection of a location by the user;  
   identify the location based on the received data;  
   receive the weather conditions from the first receiver;  
   and  
   display a weather prediction for the location based on the received weather conditions and the location.
44. The apparatus of claim 43, wherein the display of the weather prediction occurs during display of the weather conditions.
45. The apparatus of claim 43, further comprising:  
 the weather station unit, wherein the weather station unit is configured to be readily portable, battery-powered and hand-holdable, and the weather station unit includes:  
   at least one data sensor for sensing the weather conditions; and  
   a transmitter for transmitting the weather conditions to the weather display unit via a digital signal.
46. An apparatus comprising:  
 a readily portable, battery-powered and hand-holdable weather display unit including:  
   a first receiver configured for receiving weather conditions from a weather station unit;  
   a second receiver configured for receiving a signal from a remote source that is different than the weather station unit;  
   a display, including a prompt; and  
   a processing device configured to:  
     receive data representative of the signal from the second receiver;  
     receive the weather conditions from the first receiver;  
     receive location data, via the prompt, identifying a location,  
     subsequent to receiving the location data, receive historical weather condition data corresponding to the location,  
     determine a predicted weather condition by performing a correlation of the weather conditions and the historical weather data, and  
     display the predicted weather condition and one or more of the weather conditions.
47. The apparatus of claim 46, wherein displaying the predicted weather condition occurs during the display of the one or more of the weather conditions.

## 14

48. The apparatus of claim 46, further comprising:  
 the weather station unit, wherein the weather station unit is configured to be readily portable, battery-powered and hand-holdable, and the weather station unit includes:  
   at least one data sensor for sensing the weather conditions; and  
   a transmitter for transmitting the weather conditions to the weather display unit via a digital signal.
49. An apparatus comprising:  
 a readily portable, battery-powered and hand-holdable weather display unit including:  
   a first receiver configured for receiving weather conditions from a weather station unit, the weather conditions representing sensed weather conditions of a first location;  
   a second receiver configured for receiving a signal from a remote source that is different than the weather station unit;  
   a display;  
   a processing device configured to:  
     receive the weather conditions from the first receiver;  
     receive data representative of the signal from the second receiver;  
     select between a first mode of operation that displays the weather conditions received from the weather station unit and a second mode of operation that displays second weather conditions representative of conditions at a second location that is different than the first location, and  
     based on the selected mode of operation, display one or more weather conditions from at least one of the weather conditions received from the weather station unit and the second weather conditions.
50. An apparatus comprising:  
 a readily portable, battery-powered and hand-holdable unit comprising:  
   a first receiver configured for receiving data via a first radio frequency signal from a source;  
   a second receiver configured for receiving a second radio frequency signal from a cellular telephone network, wherein the cellular telephone network is different than the source;  
   a display configured to display a date and a time;  
   a processing device configured for a) enabling display of information based on received data of at least one of the first radio frequency signal and the second radio frequency signal, b) selecting between a first mode of operation that displays first weather conditions including temperature at a first location and a second mode of operation that displays second weather conditions at a second location different than the first location, c) and displaying a prediction of a future weather condition.

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